COCHLEAR IMPLANT COMPARISON CHART

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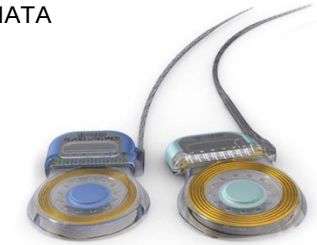
	ADVANCED BIONICS	COCHLEAR	MED-EL	COMMENTS
	Advanced Bionics	Cochlear	MED-EL	Cochlear images provided courtesy of Cochlear™ Americas, © 2009 Cochlear Americas
CORPORATE OWNERSHIP	Owned by: Sonova Holding AG [1] Traded as: PHBN:GR SONVF:US SOON1:EB SOON:BQ SOON:TQ SONVY:US	Traded as: COH:AU CHEOF:US OC5:GR CHEOY:US	Privately owned & founded by: Prof. Erwin Hochmair + Dr. Ingeborg Hochmair	
ESTABLISHED, LOCATION	AB: 1993 California, USA Sonova: 1947 Switzerland	1981 Australia	1977 Austria	
US PATENTS (AS OF 27-JUL-14)	419	340	126	USA patents only to avoid global duplications: US Patent Office Quick Search by "*Assignee Name*" Google Patent Search
ESTIMATED MARKET SHARE	15%	65% [2]	--	
CURRENT IMPLANT IMAGES NOT TO SCALE	HiRes 90K Advantage HiRes 90k 	CI422 Slim Straight (not shown) CI24RE Contour Advance (CA) or Straight (ST) CI24R Double Array (not shown) 	CONCERT SONATA 	**COMING SOON!** MED-EL's SYNCHRONY Cochlear Implant System PENDING REGULATORY APPROVAL NOT AVAILABLE IN ALL MARKETS Factsheet

[1] Sonova Holding AG owns Phonak.
[2] Advanced Bionics' New Tech Could Take Share From Cochlear

	ADVANCED BIONICS	COCHLEAR	MED-EL	COMMENTS
MAXIMUM STIMULATION RATE	83,000 PPS	32,000 PPS [3]	51,000 PPS	PPS rate is the number of updates per second the implant is capable of providing.
CHANNELS	16 (120 virtual)	22	12	
ELECTRODES	16	22	Up to 24	Electrical contacts between the implant and the cochlea.
ELECTRODE DRIVERS	16	1	12	Electrode drivers generally use paired current sources.
MAXIMUM SIMULTANEOUS ELECTRODE DRIVERS	4	1	1	
RF CARRIER & DATA RATE	49 MHz, 1Mb sec [4]	5 MHz, 0.5Mb sec [4]	12 MHz, 0.6Mb sec [4]	Implant to sound processor communication frequency & data rate.
ELECTRODE ARRAY	HiFocus Mid-Scala HiFocus 1J HiFocus Helix	CI422 Slim Straight CI24RE (CA) [5] CI24RE (ST) [5] CI24R Double Array [5]	FLEX 28 FLEX 24 Standard Medium Compressed	Multiple array types provide options for unusual physiologies. New MED-EL FLEX arrays are smaller in diameter. [6]
LENGTH OF ELECTRODE ARRAYS	HiFocus Mid-Scala: 18.5/15.0 1J: 25.0/17.0 Helix: 24.5/13.25	CI422: 25.0/20.0 CI24RE (CA): 23.9/15.0 CI24RE (ST): 28.0/16.4 CI24R: 15.0/8.25	FLEX 28: 28.0/23.1 FLEX 24: 24.0/20.9 Standard: 31.5/26.4 Medium: 24.0/20.9 Compressed: 21.1/15.0	Measurements in millimeters (mm). Electrode arrays in total/active lengths, if known.
IMPLANT HOUSING & COIL DIMENSIONS (WITHOUT ARRAY)	Advantage: 56.0 x 28.0 HiRes 90K: 56.0 x 28.0	CI422: 50.5 x 30.6 CI24RE: 51.2 x 30.9 CI24R: 51.2 x 30.9	CONCERT: 45.7 x 25.4 SONATA: 45.7 x 24.8 PULSAR: 33.6 x 26.4	Length (L) x Width (W) Measurements in millimeters (mm).
IMPLANT CASE THICKNESS	Advantage: 5.5 HiRes 90K: 5.5	CI422: 6.9 CI24RE: 6.9 CI24R: 6.9	CONCERT: 4.5 SONATA: 5.9 PULSAR: 4.0	Measurements in millimeters (mm).

[3] CI24R Double Array 14,400 PPS
[4] Zeng FG, Rebscher S, Harrison W, Sun X, Feng H., " Cochlear Implants: System Design, Integration, and Evaluation" Page 63 Table II
[5] Cochlear CI24RE housing and coil available with two electrode array configurations, Contour Advance (CA) and Full Band Straight (ST). CI24R is configured with a split array for ossification.
[6] MED-EL offers four unique electrode array designs in the FLEX Portfolio.

	ADVANCED BIONICS	COCHLEAR	MED-EL	COMMENTS
BONE RECESS DEPTH	Advantage: 3.0 HiRes 90K: 3.0	CI422: 2.3 CI24RE: 2.3 CI24R: 2.3	CONCERT: N/A [7] SONATA: 2.0 PULSAR: Data not available	Measurements in millimeters (mm). See American Academy of Audiology "To Drill or not to Drill a Well for the Cochlear Implant's Internal Device?"
ELEVATION FROM BONE	Advantage: 2.5 HiRes 90K: 2.5	CI422: 4.6 CI24RE: 4.6 CI24R: 4.6	CONCERT: 4.5 SONATA: 3.9 PULSAR: Data not available	Measurements in millimeters (mm). Elevation from bone often referred to as "bump height."
IMPLANT WEIGHT	Advantage: 12.0 HiRes 90K: 12.0	CI422: 9.5 CI24RE: 9.5 CI24R: 9.5	CONCERT: 7.6 SONATA: 8.6 PULSAR: 9.3	Weight in grams (g).
IMPLANT CASING	Advantage: Titanium HiRes 90K: Titanium	CI422: Titanium CI24RE: Titanium CI24R: Titanium	CONCERT: Titanium SONATA: Titanium PULSAR: Ceramic	
IMPACT RESISTANCE	6 Joules	1 Joule	2.5 Joules	Damage resistance from accidental impact.
REMOVABLE MAGNET	Yes	Yes	No	Magnet removal instructions are available from each implant manufacturer; procedure should always be coordinated with the implant center.
MRI WITH MAGNET	--	0.2 Tesla or less	1.5 Tesla [8]	Indications for MRI safety, with or without magnets, vary by country subject to regulatory approval.[9]
MRI WITH MAGNET REMOVED	0.3 Tesla and 1.5 Tesla	Up to and including 1.5 Tesla [10]	--	MRI Safety website Cochlear Implant Safety Cochlear Implant List
WARRANTY	10 years	10 years	10 years	
CURRENT RELIABILITY	2013 Reliability Report	2014 Reliability Report	Reliability Information	All manufacturers claim top reliability. Search the FDA database; Product Code: MCM Reliability overview.

[7] Available without or with fixation pins requiring two 1.0mm x 1.4mm recesses.
[8] Has been FDA approved.
[9] Magnet Dislocation: An Increasing and Serious Complication Following MRI in Patients with Cochlear Implants
[10] MRI compatibility varies by country and/or regulatory agency. See Global Warnings. MRI at 3.0 Tesla may be available with a compression bandage; instructions and white paper.

	ADVANCED BIONICS	COCHLEAR	MED-EL	COMMENTS
CURRENT PROCESSOR IMAGES NOT TO SCALE	Naída CI Q70 [11] User Guide 	Nucleus® 6 [12] CP910 & CP920 User Guide 	RONDO [13] User Manual 	Latest processor from each manufacturer may not be available in all markets. **COMING SOON!** MED-EL's SONNET Audio Processor PENDING REGULATORY APPROVAL NOT AVAILABLE IN ALL MARKETS Factsheet
CURRENT PROCESSOR IMAGES NOT TO SCALE	Neptune User Guide 		OPUS 2 User Manual 	Each manufacturer offers multiple wearing options.
REMOTE CONTROL IMAGES NOT TO SCALE	Naída CI Q70 MyPilot User Guide 	Nucleus® 6 System CR230 Remote Assistant User Guide CR210 Remote Control User Guide 	FineTuner User Manual (pages 9-11) 	Remote control discussion.

[11] Naida CI Q70 has received FDA approval; has been approved in Europe, Canada and other markets; other markets are pending.
[12] Nucleus® 6 (CP900 series) has received FDA and the CE Mark approval, and has been approved in Canada. Other markets are pending. If the Nucleus 6 CP910 & Nucleus 6 CP920 features/functions are the same use of Nucleus 6 will refer to both.
[13] RONDO is backward compatible to all implants since 1996.

	ADVANCED BIONICS	COCHLEAR	MED-EL	COMMENTS
PROCESSOR DIMENSIONS AS INDICATED IN MANUFACTURER'S LITERATURE	Naída with PowerCel 110: 49 x 9 x 19 PowerCel 170: 55 x 9 x 19 PowerCel 230: 59 x 9 x 19 Zinc-Air Pak: 53 x 9 x 19 Neptune: 26 x 18 x 60 Neptune Connect: 17 x 18 x 58	Nucleus 6 CP910 with Compact: 42.3 x 9 x 47.7 Standard: 51.3 x 9 x 47.7 Zinc-air: 51.3 x 9 x 47.7 Nucleus 6 CP920 with Compact: 39.1 x 9 x 47.7 Standard: 48.1 x 9 x 47.7 Zinc-air: 48.1 x 9 x 47.7	OPUS 2 with XS: 48.0 x 8.7 x 36.5 DaCapo: 57.8 x 8.7 x 36.5 Standard: 57.8 x 8.7 x 36.5 RONDO: 44.1 x 11.8 x 37.2	Dimensions in millimeters Height (H) x Width (W) x Depth (D) Naída depth dimensions are without an earhook or T-Mic 2. Neptune dimensions with water-proof configuration & Color Cover. Cochlear Nucleus 6 dimensions are with a medium earhook. MED-EL OPUS 2 XS & Standard battery packs use disposable zinc-air batteries.
PROCESSOR WEIGHT	Naída with PowerCel 110: 11g PowerCel 170: 13g PowerCel 230: 13g Zinc-Air Pak: 13g Neptune: 32g Neptune with Connect: 43g	Nucleus 6 CP910 with Compact: 10.5g Standard: 13.0g Zinc-air: 12.8g Nucleus 6 CP920 with Compact: 9.8g Standard: 12.4g Zinc-air: 12.1g	OPUS 2 with XS: 9.4g DaCapo: 10.1g Standard: 12.4g RONDO: 21.5g with magnet & batteries	Weights are in grams. Weights of battery packs include batteries.
WATERPROOF	IP57: Naída IP68: Naída with AquaCase [14] with AquaMic & PowerCel 110 battery. IP68: Neptune sound processor & AquaMic configuration.	IP44: Nucleus 6 processor with disposable battery module. IP57: Nucleus 6 processor with rechargeable battery module. IP68: Nucleus 6 Aqua+ [14] with Aqua+ coil & rechargeable batteries.	OPUS 2: No claims made. RONDO: No claims made.	IP rating description.
MICROPHONE	Naída: T-Mic2 at ear canal entrance, two omnidirectional on top, one located in headpiece. Neptune: Located in headpiece, T-Mic with T-Comm	Nucleus 6: Two omnidirectional on top.	OPUS 2: One omnidirectional on top. RONDO: One omnidirectional.	
MICROPHONE AT ENTRANCE TO EAR CANAL	Naída: Yes Neptune: Yes with T-Comm accessory	No	No	Microphone at the ear canal instead of above the ear - better in noise, natural telephone and headphone placement.
INPUT DYNAMIC RANGE (IDR)	Up to 80dB	Up to 45dB [15]	75dB	IDR discussion.
SOUND CODING STRATEGIES	CIS, MPS, HiRes-P/S, HiRes F120-P/S [16], ClearVoice [16], HiRes Optima [16] [17]	ACE, CIS, SPEAK	HD-CIS, FSP [18], FS4 [19], FS4-p [19]	These allow the audiologist to give you a different way to "hear" sound.

[14] Not approved in all markets.
[15] (IIDR) instantaneous input dynamic range
[16] Not approved for pediatric patients in the United States; may be available "off-label."
[17] HiRes Optima processing on the HiRes Fidelity 120 platform increases battery capabilities.
[18] Not approved for pediatric patients in the United States; may be available "off-label."
[19] Not approved in United States; subject to regulatory approval in other markets.

	ADVANCED BIONICS	COCHLEAR	MED-EL	COMMENTS
PROGRAM SLOTS	Naída: 5 [20] Neptune: 3	Nucleus 6: 4	OPUS 2: 4 RONDO: 4	
USER CONTROLS	Naída: Button functions for program changing, volume level, microphone sensitivity & standby mode; bilateral users can use one MyPilot to adjust both processors. Neptune: Program switch, volume dial, sensitivity dial	Nucleus 6: Button functions for on/off, button lock on/off, program changing, volume level, microphone sensitivity & telecoil on/off; bilateral users can use one Remote Assistant or Remote Control to adjust both processors.	OPUS 2: Battery pack lock controls on/off, all other functions available on the FineTuner. Bilateral users can use one FineTuner to adjust both processors. RONDO: Same as OPUS 2	User controls are clinician enabled.
BATTERY WARNING	Naída: Yes Neptune: Yes	Nucleus 6: Yes	OPUS 2: Yes RONDO: Yes	Audible beeps are programmable.
LED STATUS	Naída: Yes Neptune: Yes	Nucleus 6: Yes	OPUS 2: Yes RONDO: Yes (2)	Visual status indicator for parent, caregiver or teacher.
BATTERY LIFE MANUFACTURER CLAIMS OF MAXIMUM OPERATING TIME	Naída PowerCel 110: 17 hours 170: 27 hours 230: 36 hours Zinc-Air: 56 hours AAA: 183 hours Neptune Ni-MH AAA: 21 hours Alkaline AAA: 21 hours Lithium AAA: 30 hours	Nucleus 6 Compact: 18 hours Standard: 31 hours Zinc-air: 60 hours	OPUS 2 XS: 60 hours [21] DaCapo: 16 hours [21] Standard: 90 hours [21] RONDO 3 zinc-air: 5 days	Zinc-air batteries (675) are disposable; others are rechargeable. Programming algorithms trade battery life for hearing performance. For BTE processors each manufacturer may have off the ear battery options.
WARRANTY	Naída processor: 3 years UHP & Cables: 3 years T-Mic 2: 3 years Neptune: 3 years UHP: 3 years AquaMic: 2 years Cables: 1 year Global warranty	Nucleus 6 Processor: 5 years [22] Coil & Cables: 5 years [22] USA Warranty	OPUS 2 processor: 3 years Coil & Cables : 3 years OPUS 2: 5 years (USA only) RONDO: 5 years (USA only)	Warranty period generally starts on day of initial activation, may vary per country. Manufacturers may offer a one-time replacement for loss or accidental damage during the initial warranty period.

[20] Up to 10 programs stored in processor memory for bilateral users; Intellilink automatically recognizes & selects which implant the processor is fitted on.
[21] When used in combination with the D coil headpiece.
[22] USA only. “Three (3) year warranty when purchased as part of an upgrade.” Three (3) year warranty in most global markets.

	ADVANCED BIONICS	COCHLEAR	MED-EL	COMMENTS
DIRECT CONNECT	Naída: Yes with ComPilot Neptune: Yes	Nucleus 6 CP910: Yes Nucleus 6 CP920: No	OPUS 2: Yes with FM Battery Pack Cover RONDO: Yes with Mini Battery Pack	Audio cable plugged directly into processor or accessory. Bilateral implantees can listen in stereo.
AUXILIARY INPUT	Naída: Accessory socket on ComPilot Neptune: Accessory socket, T-Mic with T-Comm	Nucleus 6 CP910: Accessory socket for adapters Nucleus 6 CP920: None	OPUS 2: Accessory socket on bottom of FM Battery Pack Cover RONDO: Accessory socket on bottom of Mini Battery Pack	
TELECOIL	Naída: Yes Neptune: Yes with T-Comm	Nucleus 6: Yes	OPUS 2: Yes RONDO: Yes	Telecoil (mono signal) provides wireless (magnetic induction) access to hearing aid compatible telephones, and induction loop systems in many public & private buildings or areas.
FM	Naída: Yes, with Roger digital FM on the PowerCel 170 battery. Neptune: Yes, with Euro FM port	Nucleus 6: *Under development* wireless to dedicated transmitters	OPUS 2: Yes, using telecoil with FM Battery Pack Cover RONDO: Yes, using telecoil with Mini Battery Pack	FM is a wireless analog or digital transmission from a micro-phone or other transmitter either directly to the processor or gateway device.
BLUETOOTH	Naída CI: Yes, with ComPilot Neptune: Yes, with MLxi and Phonak SmartLink+	Nucleus 6: *Under development* with Wireless Phone Clip	OPUS 2: Yes, using telecoil with a 3rd party system RONDO: Yes, using telecoil with a 3rd party system	External Bluetooth adapters can be used on sound processors with direct connect inputs or via FM transmitters.
WIRELESS BILATERAL CONTROLS	Naída: Yes [23] Neptune: No	Nucleus 6: Yes	OPUS 2: Yes RONDO: Yes	Bilateral users can control both processors from either processor.
WIRELESS BILATERAL STREAMING	Naída: Yes Neptune: No	Nucleus 6: No	OPUS 2: No RONDO: No	Sound from one processor can be streamed to the other processor, such as telephone calls and in situations where the desired sound is on one side (e.g. in a car).
WIRELESS BIMODAL STREAMING	Naida: With compatible Phonak Hearing Aid Neptune: No	Nucleus 6: *Under development* with compatible GN ReSound hearing aid	OPUS 2: With telecoil only RONDO: With telecoil only	Wireless Bluetooth streaming to both a hearing aid and an implant sound processor.
CLINIC FINDER	Advanced Bionics Clinic Finder	Cochlear Clinic Finder	Med-EL Clinic Finder	Contact clinic to verify that they offer the implant of your choice.

[23] QuickSync feature allows for simultaneous volume & program setting adjustments on two sound processors; bilateral users have ability to control both sound processors from one without a remote control.

	ADVANCED BIONICS	COCHLEAR	MED-EL	COMMENTS
MANUFACTURER SPONSORED REHABILITATION	The Listening Room Musical Atmospheres	Rehabilitation resources HOPE (Re)habilitation Resources Listening Tools	Programme for Interactive Listening Activities Bridge to Better Communication Bridge Downloads	Rehabilitation is critical for cochlear implant success, with lots of material on line, apps to download, etc. Large spreadsheet of rehabilitation apps created and maintained by Tina Childress, AuD.
MANUFACTURER FORUMS	USA/CAN: Hearing Journey Spain: Hearing Journey Netherlands: Hearing Journey Germany: Hearing Journey France: Hearing Journey	Cochlear Community UK Cochlear Club	Hear Peers	By joining an online forum users & candidates community can learn about cochlear implants from people who use them daily.
MANUFACTURER FACEBOOK PRESENCE	English (International) English (UK) Spanish (Latin America & Spain) Dutch (Nederland) German (Germany) French (France)	English (USA & Canada) English (Asia Pacific) English (EU, ME & Africa)	English (International) German (Germany) Spanish (Spain) Spanish (Latin America) Italian (Italy) Vietnamese (Viet Nam)	Manufacturer Facebook pages are where manufacturers members share & exchange information.
MANUFACTURER SPONSORED SUPPORT	Bionic Ear Association Connect with the Bionic Ear Association (BEA), a support network of volunteers & hearing health professionals. EU Newsletter	Cochlear country website Connect with a global team of volunteers around the world through the Cochlear Awareness Network (CAN).	Connect with the MED-EL US Patient Support Team MED-EL Offices Worldwide	
MANUFACTURER SOCIAL MEDIA PRESENCE	YouTube Twitter LinkedIn Pinterest Instagram	YouTube Twitter LinkedIn Pinterest Instagram	YouTube Twitter LinkedIn Pinterest Instagram	
VOLUNTEER PROGRAMS	Bionic Ear Association (BEA): USA, UK, Spain, Germany, Nederlands	Volunteer Advocates (UK) Cochlear Community (US) Cochlear Awareness (AU/NZ)		Volunteer implantees are often matched with “candidates” who are seeking one-on-one support through in-person contact or by email.
RUMORS	Upcoming sound processing may include excitation beyond the end of the array for extra low bass response.	Software under development for the Nucleus 6 sound processor to provide wireless connectivity.	OPUS 2 and RONDO have been developed to support upcoming sound coding strategies.	Search the FDA Premarket Approval (PMA) database (MCM code). All manufacturers invest heavily in R&D bringing spirited competition for better performing implants and smaller sound processors advancing technologies.